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"Damage Control" I - the Birth of Public Deception

"I am Oz, the Great and Terrible," said the little man, in a trembling voice, "but don't strike me—please don't—and I'll do anything you want me to."

Our friends looked at him in surprise and dismay.

"I thought Oz was a great Head," said Dorothy.

"And I thought Oz was a lovely Lady," said the Scarecrow.

"And I thought Oz was a terrible Beast," said the Tin Woodman.

"And I thought Oz was a Ball of Fire," exclaimed the Lion.

"No; you are all wrong," said the little man, meekly. "I have been making believe."

—L. F. Baum
The Wizard of Oz

1

These issues of danger related to radiofrequency radiation and portable cellular telephones began taking form nearly twenty years ago. And as with most conflicting views that erupt into battles or wars, it is seldom the

igniting spark that is really the focal point of disagreement; so, too, with the developing battles over radiofrequency radiation. The issues were defined and resolved in the past by scientific research. However, the telecommunications industry can't abide by those research findings.

The telecommunications industry would never have grown to the global force, with virtually unlimited power, that we know it to have today if it accepted the scientific research. So the industry did as has been done throughout history. The industry developed a "belief" system. The wonderful thing about a "belief" system is that it doesn't require any scientific findings. And any contrary findings that do develop are easily dismissed—as being unbelievable.

The authoritative community does quite well with "belief" systems from time to time. Some examples: (1) the scientific community and dominant religious authorities "believed" that the Earth was flat; (2) the scientific community and, again, the dominant religious authorities of the time "believed" that the Earth was the center of the universe; (3) scientific calculations supported the "belief" that man could not survive travel at speeds greater than sixty mph; (4) tobacco industry representatives "believe" that cigarette smoking is not harmful and that nicotine is not addictive; (5) prior to 1900 physicists were convinced that all significant discoveries had already been made and only minor technical corrections would occur in the future.

But as Carl Sagan so elegantly phrased it and as we've taken the liberty of pointing out in the introduction to an earlier chapter,

There are many cases where the belief system is so absurd that scientists dismiss it instantly but never

commit their arguments to print. I believe this is a mistake. Science, especially today, depends upon public support. Because most people have, unfortunately, a very inadequate knowledge of science and technology, intelligent decision making on scientific issues is difficult. Some pseudoscience is a profitable enterprise, and there are proponents who not only are strongly identified with the issue in question but also make large amounts of money from it. They are willing to commit major resources to defend their contentions. Some scientists seem unwilling to engage in public confrontations on borderline science issues because of the effort required and the possibility they will be perceived to lose a public debate.¹⁸⁰

Prior to 1976 there was little need to establish any defined points of view on the issues of radiofrequency energy exposure. Up to that time there were few personal transceiver devices except for the low-frequency walkie talkies used by the military and a few law enforcement groups. But with the introduction of higher-frequency portable transceivers, a distinct division among bioeffects researchers became noticeable.

Up to that time the influences of product manufacturers appeared to be less strong or, perhaps, less visibly applied possibly due to a lack of products that would have turned their attention to the bioeffects issue. However, any lack of interest was quickly replaced with a highly focused awareness, due to the fact that by the late 1970s the manufacturers were well on their way with development of the technology that would produce the first generation of portable cellular telephones. Couple to

¹⁸⁰ Carl Sagan, *Broca's Brain* (New York: Random House, 1979), p. 59.

that an emerging concern related to the safety of portable radios, such as those used by law enforcement and emergency services personnel, and it is not hard to understand how a shift in published research could ensue.

Once the bioeffects research field captured the attention of industry, it moved quickly to sweep away the body of unfavorable research and implement its own "belief" system. That system has been functioning for these past twenty years.

For whatever reasons, from about 1976 forward there has grown an increasingly marked division among researchers that places them into two distinct camps. The first subscribes to the belief that radiofrequency radiation exposure, under some conditions, will cause destructive effects in humans. The second group of researchers maintains, as does industry, that if you can't specify one, and only one, definitive causation mechanism, then there is no harm.

That is the challenge to the bioeffects research community. If researchers identify two, five, or ten interaction mechanisms that lead to the damage, the industry won't buy it. They say it must be one cause. That amounts to having a burglar demand that the victim must be able to tell the court what color shirt he, the burglar, was wearing on the night of the burglary or he gets off free. Never mind any other evidence. But how is it that such a twisted situation is allowed to exist with this telecommunications industry?

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As researchers have continued to expand their understanding and describe the interactions of low-level radiofrequency energy with biological tissue, the conditions of

the exposures also began to draw some serious attention. Since some of that work has indicated that exposure of the brain is more critical than exposure of other parts of the body, more work in that area was, naturally, expected. At the same time, other researchers continue to emphasize that energy absorption "hot spots" are ubiquitous in biological systems.

So many different "hot spot" locations and mechanisms for creating the "hot spots" in the human brain have been identified that it's really difficult to imagine operating a portable cellular telephone without believing that one or more such "hot spots" are being continually energized within one's brain. Even today while the investigations of "hot spot" effects and mechanisms continue, researchers report additional findings of low-level radiation effects. With all of the information tying localized absorptions to the specific features of the human head and brain, shouldn't we expect that the industry and its funded researchers would insist on using laboratory models that more closely resemble the models used for computer analysis?

After all, the telecommunications industry typically employs material science specialists and university researchers to develop materials with specific properties needed for electronic circuitry. But after working the bioeffects field for more than twenty years this same innovative group of product manufacturers hasn't been able to, or hasn't thought it important enough to, develop a suitable set of synthetic materials to be used in the systems for testing the safe exposure of humans to radiofrequency radiation from transmitting antennas?

There is no problem with radiating antennas in and of themselves. The problem arises when the antennas are operated very close to an energy-absorbing material. The

human head is an excellent radiofrequency energy—absorbing material. At some frequencies it acts like a sponge and placing a radiating antenna close to the head will cause the stored energy and radiated energy to be "sucked" into the head and brain. Iskander's group reconfirmed the physics of much higher stored energy and graphically depicted the enhancement effects as a human head model is moved ever closer to a radiating element.

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Some of the reasons given to justify the exclusion clause have already been discussed. But it may be more important to make known the fact that only a fraction of the overall committee membership is well schooled in the principles of electromagnetics and energy propagation. Those who aren't will rely on those who are—mostly industry and military scientists. Since there is a diversity of groups within the committee, each with its own particular agenda, there is also opportunity for striking mutually beneficial agreements or exerting a special kind of influence that might seem out of place in a more open forum.

Industry proponents worked closely with committee members in carving the portable transmitter products away from any regulations, much the way tobacco company lobbyists and representatives have been able to exempt their products from the various agricultural, drug, and environmental regulations.

The addition of a single paragraph or sentence, properly placed into an otherwise well drafted safety standard, can render that standard useless for the control

of radiation deposited into the brains of tens of millions of people.

Industry research both internal and published clearly indicates that company engineers and scientists are well aware of the excessive and dangerous power density levels to which users of the portable products, such as portable cellular telephones, are exposed. In some examples, which have been discussed, industry researchers confirmed that in order to comply with the proposed safety standards the portable transmitter power level would need to be reduced to about 0.001 watt. That means in order for some of the companies' portables to comply with the proposed safety standard the power would have to be reduced by a factor of about 600, and that's just to meet the power density safety level. That doesn't even consider "a safety margin for the many enhancement and "hot spot" mechanisms.

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The IEEE/ANSI C95.1—1982 safety standard also included a safe energy absorption level based on the amount of energy absorbed within the body. However, as with the power density guide, portable radios and portable cellular telephones were categorically exempted. If the portables were required to comply with the SAR (Specific Absorption Rate) levels it would have meant a limit of 8.0 mW deposited into any one gram of tissue. The standard is also conveniently, and artificially, structured so that highly localized "hot spots" can be "averaged out" over a full gram of tissue. One gram is the smallest unit of tissue that the standards consider. Further, the standard has defined that the one gram of tissue

must be in the form of a cube. This allows researchers, motivated to do so, to arbitrarily select—to hunt, so to speak, for areas of lower energy absorption that can be used to help lower the "average" absorption level that is reported.

We already know that energy deposition into tissue results in heating. Absorption of 8 mW into a single gram (8 mW/g) or into approximately one cubic centimeter results in approximately a 1—2°C temperature increase in that tissue. We also know that temperature increases within the brain of 1—2°C will result in tissue damage. So the safety standard effectively established a "safe" exposure level that first allows for damage or destruction of brain tissue and, second, exempts the most serious offenders. Since 1982, the IEEE/ANSI standard has been further revised to limit the maximum absorption to 1.6 mW/g. Even though a blizzard of research reports now find that the portables exceed that radiation absorption level, no action is taken—the portables remain exempt by virtue of the FCC's "grandfathering" of existing products.

Without fear of being corrected, the cellular industry has always stated that their portable telephones meet the IEEE/ANSI standards. However, the industry never says that the ANSI safety standards didn't apply to portable cellular telephones. The industry never says that the ANSI safety standards categorically excluded portable cellular telephones from any of the radiation exposure limits.

Even with all of the background activity related to tailoring the safety standards to suit the manufacturers and system operators, research continues to uncover disturbing pieces of evidence. Rather than the benign technology the industry claims, the evidence continues to

paint a malignant picture of the effects to be expected due to human exposure to radiofrequency radiation.

Exposure standards, such as ANSI C95.1, are based on a biophysical approach that looks for observable behavioral and immediate physiological effects in laboratory animals. But damage to brain tissue is not expected to result in immediate physiological symptoms unless the damage is extensive. Long-term effects are also an entirely different matter. Even when behavioral and other bioeffects, such as tumors, are documented in laboratory animals, a typical industry response is that the results cannot be used or extrapolated to humans. But why, then, do we not hear the same criticisms voiced when supposed "safety levels" are established by using the same laboratory animals?

C. H. Durney pointed out the apparent Catch—22 when he observed that humans cannot be used as test subjects—"guinea pigs".¹⁸¹ If the cellular industry convinces the responsible government agencies that laboratory data from animal experiments cannot be used and also convinces those agencies that human experiments are unethical, then the industry is free to do as it pleases. What a wonderful environment for the free reign of unencumbered commercialization of technology. In that environment the saying "let the buyer beware" will take on a whole new meaning.

But Durney's admission is unusual because even with nuclear radiation experiments humans were used. With radiofrequency radiation it may be that the potential for harm to human test subjects is already so well

¹⁸¹ C. H. Durney, "Electromagnetic Dosimetry for Models of Humans and Animals: A Review of Theoretical and Numerical Techniques," *Proceedings of the IEEE* 68, no. 1 (January 1980):33-40.

known that human testing is unthinkable. With radiofrequency energy testing there should never be an instance when the testing is performed without the informed consent of the test subject—such as portable cellular phone users.

As such, the other laboratory techniques are employed to determine exposure, absorption levels, and effects. Numerical analysis is commonly employed to provide solutions for radiation absorption by computer-simulated human bodies. Sophisticated computer analysis is available for frequencies including the cellular telephone transmit range and with complex models of the human head and brain.

Currently computer models comprised of millions of cells can subdivide the human head into as many layers as exist in reality. Further, a cell size of only a couple of millimeters greatly improves the resolution available to detect localized "hot spots." Couple this with MRI techniques and the picture is of a truly sophisticated modeling capability, but it still requires proper data input for accurate output data. The old saying "garbage in - garbage out" remains true especially for the computer modeling experiments. If researchers insert nonrepresentative material characteristics, tissue types, or physical structures, their sophisticated results will be little more than sophisticated garbage.

We already know of at least a couple of instances when nonrepresentative input data and test conditions were used to arrive at completely erroneous conclusions that have been broadcast worldwide. The basis on which the industry's representations of safety have been established is rooted solely in the "belief" that any short-term exposure that does not cause an

immediate, observable effect must be safe. The standard-setting committee has taken the position, in the past, that if any effect were to occur they "believe" that researchers should be able to observe and measure that effect immediately. Of course, we realize that such thinking is as nonsensical as "believing" that exposure to nuclear radiation is harmless because the effects take years to be seen.

Some in the research community do not buy into the dogmatic posturing and continue the research to learn bioeffects interaction mechanisms. Today research activity related to finding biological effects tied to low-level exposures to radiofrequency radiation has moved into the forefront, while research into thermal effects continues in the background.

Most notable is a 1980 review of scientific research that nicely describes the conflicts between the two opposite research groups. In that review H. Cook, who received his funding from the National Science Foundation, concluded that some of the prior research did not proceed in a professional or scientific manner.¹⁸² Therefore, no conclusions could be drawn, with respect to dosimetry and experimental techniques, from papers presented at the suspect Fourth Tri-Services Conference (1960). In effect, Cook was indicating that the dosimetry studies had provided artificially optimistic findings.

It's very enlightening to learn that even during the early 1980s a few researchers were outspoken on the issue of research bias. They judged some research and perhaps the industry- and military—sponsored researchers as

¹⁸² H. J. Cook, et al., "Early Research on the Biological Effects of Microwave Radiation: 1940—1960," *Annals of Science* 37 (1980):323-51

biased toward industry expectations rather than scientific knowledge.

That's a very strong conclusion to draw so early in the evolution of radiofrequency technology. We might expect that charge to be made today, in view of the raging controversy over safety issues of millions of hand-held radiofrequency transmitters. But for the industry bias in research to have become evident so long ago, when the stakes were very low, raises extreme alarm today in view of the \$100 billion industry now at stake. If researchers and industry were painted as biased and disingenuous at that time, when no corporate or economic survival was at stake, what might we expect to be occurring today that has not yet come to our attention?

The shift in focus to effects caused by low-level exposures occurred for two reasons. First, effects due to high-level exposures have been fairly well documented and accepted. Second, the telecommunications industry had been successful in convincing government agencies and a large part of the research community that damaging effects must be tied to low-level exposures. This came at a time when the industry also claimed that their portable products exposed operators only to low-levels of radiation.

Inquiries questioning the safety of radiofrequency energy absorption invariably were answered with the industry response that no link had been found between low-level radiofrequency radiation exposure and hazardous biological effects. Of course, this is a false statement. Keep in mind that with the ever-present "hot spot" absorption mechanisms, even very low radiation exposures can provide enhanced locally high-level absorptions within the brain.

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Let's reconsider the issue from a different perspective. Instead of pointing out reasons and evidence that confirm hazards or dangers, let's look at what researchers interested in utilizing the medical applications of radiofrequency energy absorption have observed.

In the United States, 915 MHz has been allocated by the FCC for medical use. If other frequencies were available for medical therapy, researchers and therapists would, no doubt, have selected a slightly lower frequency, because the frequency range just slightly below 900 MHz is optimal for absorption of radiofrequency energy—the frequency range corresponding to the portable cellular telephone transmit band.

Generally, these researchers with medical applications in mind are supporting the findings of electromagnetics and bioeffects researchers. That is, radiofrequency radiation is absorbed so well at frequencies in the range of portable cellular telephone transmissions that they, the hyperthermia researchers and therapists, will use it as a method of inducing heating or to destroy tissue. In the case of hyperthermia treatment the medical therapists intend to destroy cancerous tissue. In the case of portable cellular telephones, dangerous absorption levels and tissue destruction make no such distinction.

Moving ever closer to the time when the portables were placed on the market, researchers continued to voice their concerns about adverse biological effects in humans. At the same time, medical therapy researchers were enthusiastically enjoying the findings that the deep penetration effects of energy in the 700-950 MHz range were ideal for hyperthermia treatments. It might seem as if the researchers were working at cross-purposes, but

as with nuclear radiation, which can be medically beneficial as well as lethal, radiofrequency radiation can be medically beneficial as well as lethal. Recall that when nuclear radiation experiments began early in this century, no one understood that there was a danger. It was only years afterward, when some of the most creative and gifted researchers became ill and died of radiation poisoning, that the world believed there to be a danger. As with nuclear radiation, radiofrequency radiation is a two-edged sword.

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In the search for that one specific causation trigger, one of the mechanisms for activation of latent tumor cells has been proposed that could lead to expression of malignant neoplasia. The mechanism includes promotion via a proliferation stimulus. In his hypothesis C. E. Easterly identified magnetic fields as the stimulus that can cause latent tissue damage or cell modifications.¹⁸³ When the cell subsequently reproduces, the modifications become fixed in the cell genetics.

He compares this type of tissue injury to other widely known, causes of cancerous growths resulting from trauma, including nuclear radiation, chemical exposure, and surgical wounds. Of course, since he was only proposing a mechanism, rather than confirming one, his work was easily ignored by the industry. But it was only a matter of time until the experimental research caught up

¹⁸³ C. E. Easterly, "Cancer Link to Magnetic Field Exposure: A Hypothesis," *American Journal of Epidemiology* 114, no. 2 (August 1981):169-74.

with his hypothesis and began providing findings of DNA and chromosome damage—exactly as he predicted.

It is interesting to note that this researcher has included surgical trauma as a known or suspected cause of cancer, since that type of trauma is a single occurrence. Some other researchers subscribe to the belief that only multiple or long-term exposures can promote uncontrolled growth. That school of thought resides in a belief of an irritant as stimulus rather than direct destruction or damage of tissue. An irritant such as, for example, asbestos or cigarette smoke residue produces a result after a long-term continual exposure. However, exposures such as nuclear radiation and radiofrequency radiation are known to cause destruction and damage to tissue even with a single exposure. Today we know that even a single exposure to low-level radiofrequency radiation causes damage to the DNA makeup of brain cells.

While scientists argue the precise mechanism that causes the chromosomal and DNA changes, the general population needs to know that exposure to radiofrequency radiation, in fact, causes the alterations. The next obvious step in public discussions is to recognize that the reported genetic effects lead to mutations of cells which is manifested as cancer.

At a U.S. Senate hearing held during August 1992, Dr. W. Ross Adey confirmed that cellular telephones produce high electromagnetic fields in the brains of users. Dr. Adey is one of the most highly respected of all researchers in the field investigating biological effects of radiofrequency radiation as well as power line effects. In his statement about the high fields, Adey highlighted the cellular telephones in a group that included microwave ovens.

The same physical processes that heat and cook tissue in the microwave oven are at work in the human brain when radiofrequency radiation is absorbed. The distinctions to be made are that: (1) in the case of the microwave oven the tissue is dead and heated deliberately; (2) with portable cellular telephones the tissue is a living human brain; (3) with portable cellular telephone use the radiation source is placed directly to the head of the user; and (4) radiation levels from microwave ovens are regulated while portable cellular telephone power densities are many times greater.